

he works on to A. P. De Candolle and Schleiden (of whose importance he is very appreciative), and thence to Haeckel and Spencer, Karl Pearson, and Burckhardt. This laborious historical survey, which must have cost the author much time and trouble, is interesting to those who care for such questions, but it seems to us to be robbed of some of its value by being overloaded and by a lack of perspective. Dr. Tschulok quotes classifications of the different departments of biology from a large number of text-books, some of which are rather humdrum performances, while others are by men who left a deep mark on the science, but had neither any particular interest in mapping out its subdivisions, nor any special aptitude for so doing.

To illustrate, a man like Burckhardt was a good zoologist—too early lost to science—but he was also a philosopher. He went the length of thinking about the classification of the sciences, about the relation of biology to other disciplines, about methodology, and so on, his writings sometimes reminding us of those of Prof. Patrick Geddes in this country. Naturally, therefore, we are glad to have from Dr. Tschulok an exposition of Burckhardt's views, and we are especially grateful for the unearthing of an essay on the history of biological "Systematik," well-buried "an einem ziemlich versteckten Orte." But what we regret is the space that is given to what are really incompetent classifications. The author wearies us with citations from manuals of botany, which start with commonplace mappings out of the science, sometimes beginning with a weird word like "Glossology," and ending up with "Fossil Botany." The last is a careless usage, which in an interesting irony sometimes justifies itself. Our regret that the author has been at such pains to expose the nakedness of the land is heightened when we find that he has missed most of the few really illuminating British contributions to the subject of his book. We may refer, for instance, to well-known encyclopædia articles by Prof. Patrick Geddes and Sir E. Ray Lankester.

The author divides biology into Biotaxis and Biophysik. The first has to do with the establishment of conceptual relations, the second with the establishment of real relations—causal and teleological. Classification, for instance, is "biotactic"; physiological analysis is "biophysical." He contrasts his dual division with others, e.g., with morphology and physiology (which is a "scholasticism," he says), or with biostatistics and biodynamics, which expresses a different idea. But does Dr. Tschulok mean more than this, that we have in biology, as elsewhere, to discover the orderliness of sequences and to sum this up in conceptual formulæ?

The author's chief contribution is a scheme of the subdivisions of biology. His idea is that there are seven kinds of inquiry which are individually indispensable and collectively exhaustive. These are: taxonomy, morphology, physiology, œcology, chorology, chronology, and genetics. This appears to us to illustrate most of the vices of classification, such as overlapping, cross-division, and inequality of values. It appears to us, for instance, that taxonomy and

morphology are inseparably bound together; that œcology, as Semper said, is part of physiology; that chorology is not an independent division of the science; and so on. It must be noted, however, that Dr. Tschulok defends his seven-fold classification with enthusiasm and learning.

J. A. T.

A MONOGRAPH OF THE PETRELS.

A Monograph of the Petrels (Order Tubinares). By F. Du Cane Godman, F.R.S. With hand-coloured plates by J. G. Keulemans. Part iv., pp. 233-296; part v., pp. 297-381+lv. (London: Witherby and Co.) Price 15l. 15s., bound in full morocco.

THE fourth and fifth parts of the "Monograph of the Petrels," completing this beautiful and valuable work, have been received, and the whole work can now be had, bound in full morocco, price fifteen guineas. It contains 436 pages printed on rag paper, and over one hundred hand-coloured plates by Keulemans, our best ornithological artist. In every respect this beautiful volume has been produced in the best possible style. Nor is the letterpress any less excellent. The work was projected, if not actually begun, by the late O. Salvin, who wrote the "Tubinares" for the British Museum catalogue of birds, and the author has endeavoured to carry out the work on the lines laid down by Salvin, taking the catalogue as his guide. The final part contains a masterly introduction to the order Tubinares, a systematic list of species, a classification and key to the genera and species, and an essay by Mr. Pycraft on the systematic position of the petrels.

Petrels apparently belong to an ancient race of birds, as their remains have been found in a fossil state in various parts of the world, mostly in superficial deposits, one species, however, being known from the Red Crag of Norfolk. In external appearance the families of petrels differ in an extraordinary manner, and the species vary in size from the tiny storm petrel to the wandering albatross. Notwithstanding their wide differences, petrels may at once be distinguished from all other birds by their prominent tubular nostrils and by their bills, which consist of several horny pieces separated by deep grooves. They are dispersed throughout the oceans of the world, penetrating to the ice barrier at both Poles, though they are more numerous in the southern than in the northern hemispheres. They are oceanic wanderers, and, unless storm-driven, seldom, if ever, come to land except for the purpose of breeding.

The two parts now before us comprise the rest of the genus *Æstrelata*, and the genera *Pagodroma* (the snowy or ice petrel) *Bulweria*, *Macronectes* (the "stinker or Nelly" of the sailors), *Fulmarus*, *Daption* (the well-known "Cape Pigeon"), *Halobæna*, and *Prion*, completing the family *Puffinidæ*; the family *Pelecanoididæ* comprising one curious genus; and the family *Diomedeidæ* (the albatrosses), comprising the genera *Diomedea*, *Thalassogeron*, and *Phœbetria*. Certainly the most curious and perhaps the most interesting of all these are the strange little

diving petrels peculiar to the southern seas, and absurdly resembling the little auk of the northern seas both in appearance and habit—diving, fishing, and flying—although widely differing in structure. Darwin wrote of one of them:—

"No one seeing the bird for the first time, thus diving like a grebe, and flying in a straight line, by the rapid movements of its short wings, like an auk, would believe that it was a member of the family of petrels, the greater number of which are eminently pelagic in their habits, do not dive, and whose flight is usually most graceful and continuous."

Since the completion of Salvin's catalogue the present monograph has derived much benefit from the considerable additions to the national collection made through the several expeditions sent to the Antarctic regions, among which may be mentioned the voyages of the *Discovery*, the *Southern Cross*, the *Scotia*; and from the cruises of the *Valhalla*; as well as from the expedition sent to the Hawaiian Islands by the Hon. Walter Rothschild; these together have considerably increased our knowledge of the distribution of the petrels. A full index brings this important volume to a close.

OUR BOOK SHELF.

Eugenics, the Science of Human Improvement by Better Breeding. By C. B. Davenport. Pp. 35. (New York: Holt and Co., 1910.) Price 50 cents net.

THIS useful little book consists of two parts. The first is an account of the principles which determine whether a given marriage will produce fit or unfit offspring, the second contains suggestions for future eugenic research. In the somewhat limited class of characters and diseases for which definite Mendelian laws of inheritance have already been made out, it is possible to predict with an approach to certainty the proportion of the children which will or will not be affected. Thus the malformation of the fingers known as brachydactyly is a Mendelian dominant.

"An abnormal person married to a normal will beget 100 per cent., or 50 per cent. abnormal, according to circumstances, and such a marriage is unfit; but two parents who, though derived from brachydactyl strains, are themselves normal, "will have only normal children . . . such a union is entirely fit."

Deaf-mutism may be due to any one of a variety of defects, but in different individuals of the same family the chance is large that it is due to the same defect. Such defects are often recessives, and may appear in the offspring of normal parents of deaf-mute stocks. Intermarriage between two such parents, especially of cousins, is "unfit." Again, too, imbecile parents, whether related or not, produce only imbecile offspring, a fact which should impress those responsible for the long delay in embodying in legislation the recommendations of the Royal Commission on the Care and Control of the Feeble-Minded.

In concluding his suggestions for future inquiry, Mr. Davenport rightly points out the contrast between the difficulty of raising funds for such scientific inquiries, and the ease with which money is obtained for charitable and humanitarian action which often proves to have been ill-judged.

"One cannot fail to wonder that, where tens of millions have been given to bolster up the weak and alleviate the suffering of the sick, no important means

have been provided to enable us to learn how the stream of weak and susceptible protoplasm may be checked."

W. C. D. W.

The Book of the Dry Fly. By G. A. B. Dewar. New edition. Pp. xxvii+277. (London: A. and C. Black, 1910.) Price 7s. 6d. net.

THE second edition of Mr. Dewar's "Book of the Dry Fly" follows the first after an interval of thirteen years. It is to be regretted that this second edition is, in reality, little more than a reprint of the first; the art of dry-fly fishing has been developed, and knowledge of the natural history of the trout and of the aquatic creatures upon which it feeds has advanced during these years, and it is a little deceptive to find that references to "last year" in a book with 1910 on the title-page refer to 1896. The deception may even be turned to confusion by the addition of a footnote modifying or contradicting the statements made in the text.

However much we may regret that the book has not undergone a more complete revision, we may still be glad to find that a second edition has been published. Mr. Dewar is a student of nature, as well as a fisherman, and he writes with obvious enthusiasm and interest of various chalk and limestone streams and their surroundings. He deals well with the elements of dry-fly fishing, and appears to touch on most points likely to interest a student of that art.

There are some matters in which we find Mr. Dewar hard to follow, such as his discussion of the modern higher education of trout, but as a rule his explanations are lucid and his opinions clearly expressed. The grayling is, perhaps, treated with rather scant courtesy in the text, although the footnotes show signs of a change of view. A singular misuse of the term "dropper" in chapter ii. is obviously the result of an oversight, and this should be corrected in any future edition.

An attractive feature of the present edition of Mr. Dewar's book is the series of excellent reproductions of water-colour sketches of typical chalk and limestone streams; these should assist the fisherman who does not know the waters of Hampshire or other southern and Midland counties to appreciate the conditions which have brought dry-fly fishing into being far more easily than any mere description in words.

Last, but not least, there is a good index.

Die Entwicklung des menschlichen Geistes. By Max Verworn. Pp. iv+52. (Jena: Gustav Fischer, 1910.) Price 1 mark.

THIS is a lecture by the well-known professor of physiology in the University of Bonn, and is a kind of popular survey of human development. After dealing with the fact that "the development history of the individual form is a short recapitulation of its race development" (Fritz Müller) and with the elaboration of this by Haeckel, Dr. Verworn goes on to emphasise the importance of child-study with relation to pedagogics. A eulogy of Charles Darwin follows, and a curious and interesting table of supposed psychological development from the Eolithic to the present time.

The British Empire in Pictures. A Geographical Reading Book. By H. Clive Barnard. Pp. 64 (London: A. and C. Black, 1910.) Price 1s. 6d.

THE thirty-two excellent illustrations in colour which form the distinguishing characteristic of this book will serve excellently to predispose young pupils in favour of the study of geography. As a supplement to the more serious work of the class-room, the book should prove useful, and it should not be difficult to get children to read the book as a leisure-hour undertaking.